Analytical Laboratory

13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: **J12030290**

Project Name: WWTS - Biweekly

Customer Name(s): Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: (Signature) Digitally signed by jay perkins
DN: cn=jay perkins, o=Analytical Lab, ou, email=jay.perkins@duke-energy.com, c=US
Date: 2012.04.10 15:31:12 -04'00'

Date: 4/9/2012

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2012006457	BELEWS	14-Mar-12 8:00 AM	T. Johnson	FGD Purge Eff
2012006458	BELEWS	14-Mar-12 8:00 AM	T. Johnson	EQ TANK EFF.
2012006459	BELEWS	14-Mar-12 8:00 AM	T. Johnson	BIOREACTOR 1 INF.
2012006460	BELEWS	14-Mar-12 8:00 AM	T. Johnson	BIOREACTOR 2 INF.
2012006461	BELEWS	14-Mar-12 8:00 AM	T. Johnson	BIOREACTOR 2 EFF.
2012006462	BELEWS	14-Mar-12 8:00 AM	T. Johnson	FILTER BLANK
2012006463	BELEWS	14-Mar-12 8:00 AM	T. Johnson	Trip Blank

7 Total Samples

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).	☑ Yes	☐ No
All Results are less than the laboratory reporting limits.	☐ Yes	☑ No
All laboratory QA/QC requirements are acceptable.	☑ Yes	☐ No
The Vendor Laboratories have been qualified by the Analytical Laboratory	Yes	

Report Sections Included:

- ☑ Job Summary Report
- ☑ Sample Identification
- ☑ Technical Validation of Data Package
- ☑ Analytical Laboratory Certificate of Analysis
- ☐ Analytical Laboratory QC Report
- ☑ Sub-contracted Laboratory Results
- ☐ Customer Specific Data Sheets, Reports, & Documentation
- ☐ Customer Database Entries
- ☑ Chain of Custody
- ☐ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DataBase Administrator Date: 4/9/2012

Certificate of Laboratory Analysis

Order # J12030290

Site: FGD Purge Eff
Collection Date: 14-Mar-12 8:00 AM

Sample #: 2012006457
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**160**	mg/L		5	50	EPA 300.0	02-Apr-12 18:47	JAHERMA
Fluoride	**12**	mg/L		5	50	EPA 300.0	02-Apr-12 18:47	JAHERMA
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**189**	ug/L		5	100	EPA 245.1	21-Mar-12 07:48	AGIBBS
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**159**	mg/L		0.5	10	EPA 200.7	22-Mar-12 13:51	DJSULL1
Strontium (Sr)	**9.82**	mg/L		0.05	10	EPA 200.7	22-Mar-12 13:51	DJSULL1
DISSOLVED METALS BY ICP-MS								
Selenium (Se)	**931**	ug/L		10	10	EPA 200.8	22-Mar-12 11:06	MHH7131
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**212**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Chromium (Cr)	**250**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Copper (Cu)	**159**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Nickel (Ni)	**204**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Selenium (Se)	**4210**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
Zinc (Zn)	**340**	ug/L		10	10	EPA 200.8	22-Mar-12 10:30	MHH7131
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		
TOTAL DISSOLVED SOLIDS								
Vendor Parameter	**Complete**				1	V_PACE		

Site: EQ TANK EFF.
Collection Date: 14-Mar-12 8:00 AM

Sample #: 2012006458
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**150**	mg/L		5	50	EPA 300.0	02-Apr-12 19:05	JAHERMA
Fluoride	**12**	mg/L		5	50	EPA 300.0	02-Apr-12 19:05	JAHERMA
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**173**	ug/L		2.5	50	EPA 245.1	21-Mar-12 07:51	AGIBBS

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J12030290

Site: EQ TANK EFF. **Sample #: 2012006458**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**154**	mg/L		0.5	10	EPA 200.7	22-Mar-12 14:08	DJSULL1
Strontium (Sr)	**9.34**	mg/L		0.05	10	EPA 200.7	22-Mar-12 14:08	DJSULL1
DISSOLVED METALS BY ICP-MS								
Selenium (Se)	**873**	ug/L		10	10	EPA 200.8	22-Mar-12 11:09	MHH7131
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**193**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Chromium (Cr)	**220**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Copper (Cu)	**137**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Nickel (Ni)	**176**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Selenium (Se)	**3710**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131
Zinc (Zn)	**280**	ug/L		10	10	EPA 200.8	22-Mar-12 10:33	MHH7131

Site: BIOREACTOR 1 INF. **Sample #: 2012006459**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**150**	mg/L		5	50	EPA 300.0	02-Apr-12 20:34	JAHERMA
Fluoride	**18**	mg/L		5	50	EPA 300.0	02-Apr-12 20:34	JAHERMA
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**135**	mg/L		0.5	10	EPA 200.7	22-Mar-12 13:39	DJSULL1
Strontium (Sr)	**7.87**	mg/L		0.05	10	EPA 200.7	22-Mar-12 13:39	DJSULL1
DISSOLVED METALS BY ICP-MS								
Selenium (Se)	**715**	ug/L		10	10	EPA 200.8	22-Mar-12 11:12	MHH7131
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Chromium (Cr)	**13.1**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Copper (Cu)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Nickel (Ni)	**20.5**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Selenium (Se)	**816**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
Zinc (Zn)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:36	MHH7131
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J12030290

Site: BIOREACTOR 2 INF. **Sample #: 2012006460**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**120**	mg/L		5	50	EPA 300.0	02-Apr-12 20:52	JAHERMA
Fluoride	**15**	mg/L		5	50	EPA 300.0	02-Apr-12 20:52	JAHERMA
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**129**	mg/L		0.5	10	EPA 200.7	22-Mar-12 13:43	DJSULL1
Strontium (Sr)	**7.65**	mg/L		0.05	10	EPA 200.7	22-Mar-12 13:43	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Chromium (Cr)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Copper (Cu)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Nickel (Ni)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Selenium (Se)	**202**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131
Zinc (Zn)	**< 10**	ug/L		10	10	EPA 200.8	22-Mar-12 10:39	MHH7131

Site: BIOREACTOR 2 EFF. **Sample #: 2012006461**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**130**	mg/L		5	50	EPA 300.0	02-Apr-12 21:10	JAHERMA
Fluoride	**16**	mg/L		5	50	EPA 300.0	02-Apr-12 21:10	JAHERMA
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**< 1**	ug/L		1	20	EPA 245.1	21-Mar-12 07:53	AGIBBS
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**136**	mg/L		0.5	10	EPA 200.7	22-Mar-12 13:47	DJSULL1
Strontium (Sr)	**7.27**	mg/L		0.05	10	EPA 200.7	22-Mar-12 13:47	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Chromium (Cr)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Copper (Cu)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Nickel (Ni)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Selenium (Se)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Silver (Ag)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131
Zinc (Zn)	**< 5**	ug/L		5	5	EPA 200.8	22-Mar-12 10:42	MHH7131

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J12030290

Site: BIOREACTOR 2 EFF. **Sample #: 2012006461**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Site: FILTER BLANK **Sample #: 2012006462**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
DISSOLVED METALS BY ICP-MS								
Selenium (Se)	**2.95**	ug/L		1	1	EPA 200.8	22-Mar-12 11:03	MHH7131

Site: Trip Blank **Sample #: 2012006463**

Collection Date: 14-Mar-12 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**< 0.05**	mg/L		0.05	1	EPA 200.7	22-Mar-12 13:35	DJSULL1
Strontium (Sr)	**< 0.005**	mg/L		0.005	1	EPA 200.7	22-Mar-12 13:35	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Chromium (Cr)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Copper (Cu)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Nickel (Ni)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Selenium (Se)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Silver (Ag)	**1.05**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
Zinc (Zn)	**< 1**	ug/L		1	1	EPA 200.8	22-Mar-12 09:54	MHH7131
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

March 27, 2012

Terry Whitner
Duke Energy Carolinas, LLC
PO Box 37929
DPEHS
Charlotte, NC 28237

RE: Project: J12030290
Pace Project No.: 92114362

Dear Terry Whitner:
Enclosed are the analytical results for sample(s) received by the laboratory on March 15, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Analyses were performed at the Pace Analytical Services location indicated on the sample analyte page for analysis unless otherwise footnoted.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Erin K. Waters

Erin Waters for
Kevin Herring
kevin.herring@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: J12030290
Pace Project No.: 92114362

Asheville Certification IDs
2225 Riverside Dr., Asheville, NC 28804
Florida/NELAP Certification #: E87648
Massachusetts Certification #: M-NC030
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Certification #: 99030001
Virginia Certification #: 00072
West Virginia Certification #: 356
Virgina/VELAP Certification #: 460147

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

SAMPLE ANALYTE COUNT

Project: J12030290
Pace Project No.: 92114362

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92114362001	**2012006457**	SM 2540C	SMW	1	PASI-A

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

ANALYTICAL RESULTS

Project: J12030290
Pace Project No.: 92114362

Sample: 2012006457 **Lab ID: 92114362001** Collected: 03/14/12 08:00 Received: 03/15/12 15:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**19700**	mg/L	500	1		03/20/12 14:58		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: J12030290
Pace Project No.: 92114362

QC Batch: WET/20150
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 92114362001

METHOD BLANK: 738207
Matrix: Water
Associated Lab Samples: 92114362001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	03/20/12 14:57	

LABORATORY CONTROL SAMPLE: 738208

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	298	119	80-120	

SAMPLE DUPLICATE: 738209

Parameter	Units	92114107013 Result	Dup Result	RPD	Qualifiers
Total Dissolved Solids	mg/L	408	392	4	

SAMPLE DUPLICATE: 738210

Parameter	Units	92114381002 Result	Dup Result	RPD	Qualifiers
Total Dissolved Solids	mg/L	317	323	2	

QUALIFIERS

Project: J12030290
Pace Project No.: 92114362

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Acid preservation may not be appropriate for 2-Chloroethylvinyl ether, Styrene, and Vinyl chloride.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-A Pace Analytical Services - Asheville

Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: J12030290
Pace Project No.: 92114362

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92114362001	**2012006457**	SM 2540C	WET/20150		

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

March 23, 2012

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD WWTS (2010, Bi-Weekly Sampling) (LIMS # J12030290)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on March 15, 2012. The samples were received in a sealed cooler at -0.4°C on March 16, 2012. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (2010, Bi-Weekly Sampling) (LIMS # J12030290)

March 23, 2012

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on March 15, 2012. The samples were received on March 16, 2012 in a sealed container at -0.4°C.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and was designated a discrete sample identifier. An aliquot of each sample was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80^{o}C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-DRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are

standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-DRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) on March 19, 2012. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with this sample were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J12030290

Date: March 23, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	23.5	744	ND (<0.60)	2.7	ND (<1.4)	0 (0)
BioReactor 1 Inf	9.37	682	ND (<0.15)	2.12	ND (<0.35)	0.66 (1)
BioReactor 2 Eff	ND (<0.32)	ND (<0.58)	ND (<0.15)	ND (<0.35)	ND (<0.35)	0 (0)
Metals Trip Blk	ND (<0.065)	ND (<0.12)	ND (<0.030)	ND (<0.070)	ND (<0.070)	0 (0)

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution
SeCN = Selenocyanate
MeSe(IV) = Methylseleninic acid
SeMe = Selenomethionine
Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS
n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J12030290

Date: March 23, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 50x	eMDL 200x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.065	0.32	1.3
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.12	0.58	2.3
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.030	0.15	0.60
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.070	0.35	1.4
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.070	0.35	1.4

eMDL = Estimated Method Detection Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	LCS	9.57	9.77	102.0
Se(VI)	LCS	9.48	9.61	101.4
SeCN	LCS	8.92	9.07	101.7
MeSe(IV)	LCS	6.47	6.17	95.3
SeMe	LCS	9.32	8.90	95.4

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J12030290

Date: March 23, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	BioReactor 2 Eff	ND (<0.32)	ND (<0.32)	NC	NC
Se(VI)	BioReactor 2 Eff	ND (<0.58)	ND (<0.58)	NC	NC
SeCN	BioReactor 2 Eff	ND (<0.15)	ND (<0.15)	NC	NC
MeSe(IV)	BioReactor 2 Eff	ND (<0.35)	ND (<0.35)	NC	NC
SeMe	BioReactor 2 Eff	ND (<0.35)	ND (<0.35)	NC	NC

ND = Not detected at the applied dilution
NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	BioReactor 2 Eff	278.0	256.9	92.4	278.0	252.6	90.9	1.7
Se(VI)	BioReactor 2 Eff	252.3	226.7	89.9	252.3	223.6	88.7	1.4
SeCN	BioReactor 2 Eff	228.8	201.4	88.1	228.8	198.1	86.6	1.7

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 1of 5

Duke Energy

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

J120302190 Analytical Laboratory Use Only

ORDER# J12030291 cpk | MATRIX: OTHER | Samples Originating From NC ___ SC ___

Logged By: cpk | Date & Time: 3-15-12 0949

SAMPLE PROGRAM: Ground Water ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

Vendor: AS&C
PO#ISW01.1894

Cooler Temp (C): <1

Vendor: ~~PRISM~~ Pace
PO#ISW01.1913

[19] Page 1 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Dec 4th week

Customer must Complete

1)Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)		2)Phone No:	
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **		4)Fax No:	
5)Business Unit:	6)Process:	Mail Code:	
8)Oper. Unit:	9)Res. Type:	10)Reso. Center:	

MR #

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

[15] Preserv.: 1=HCl 2=H_2SO_4 3=HNO_3 4=Ice 5=None

[16] Analyses Required

LAB USE ONLY 2012006 –

[11] Lab ID	Se Speciation Bottle ID	[13] Sample Description or ID	Date	Time	Signature	[17] Comp.	[18] Grab	TDS ~~PRISM~~ Pace (4)	Hg - 245.1 (3,4)		Metals* (4)	Se, soluble (3,4)		Dionex (Br, F)			Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies) (4)				Total
457 ~~2010014~~	215 cpk	FGD Purge Eff	3/14	0800	T Johnson			1	1		1	1		1			1				7
58	16	EQ Tank Eff.							1		1	1		1*							5 ~~4~~
59	17	BioReactor 1 Inf									1	1		1*			1				5
60	18	BioReactor 2 Inf									1			1*							3
61	19	BioReactor 2 Eff							1		1			1			1				5
62	20	Filter Blk										1									1
63	21	Metals Trip Blk									1						1				3

(assigned new order, sple #'s - cpk)

The ~~metals listed below~~ will be analyzed during the months of Oct through January. Beginning in Feb. the metal analysis will fall back to 8 metals again: As,Ag,B,Cu,Cr,Ni,Se,Zn.

Customer to complete appropriate columns to right

Customer to sign & date below - fill out from left to right.

1) Relinquished By: Tom Johnson	Date/Time	2) Accepted By: cpk	Date/Time: 3-15-12
3) Relinquished By:	Date/Time	4) Accepted By:	Date/Time
5) Relinquished By:	Date/Time	6) Accepted By:	Date/Time
7) Relinquished By: cpk	Date/Time: 3-15-12	8) Accepted By: Nancy Cullinan	Date/Time: 3/16/12 9:15 Temp [illegible]
9) Seal/Locked By: cpk	Date/Time: 3-15-12	10) Seal/Lock Opened By	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By	Date/Time

Pa
A
A

Customer, IMPORTANT! Please indicate desired turnaround.

[22] Requested Turnaround
14 Days ____
*7 Days ____
- 48 Hr ____
*Other ____
* Add. Cost Will Apply
3-22-12

Comments: * Metals: As, Ag, B, Cu, Cr, Ni, Se, Zn [illegible] ICP - B, Ag

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

✓ 312030290 **Analytical Laboratory Use Only**

ORDER# J1012039 cpk | MATRIX: OTHER | Samples Originating From: NC ___ SC ___

Logged By: cpk | Date & Time: 3-15-12 0949 | SAMPLE PROGRAM: Water ___ Ground ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

Vendor: AS&C | PO#ISW01.1894 | <1 Cooler Temp (C)

Vendor: ~~PRISM~~ Pace | PO# ISW01.1913

MR #

[19]Page 1 of 2

DISTRIBUTION ORIGINAL to LAB, COPY to CLIENT

Dec 4th week

Customer must Complete

1) Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling) | 2) Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson ** | 4) Fax No:
5) Business Unit: | 6) Process: | Mail Code:
8) Oper. Unit: | 9) Res. Type: | 10) Reso. Center:

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

[15]Preserv.: 1=HCL 2=H_2SO_4 3=HNO_3 4=Ice 5=None

[16]Analyses Required

LAB USE ONLY [11]Lab ID	Se Speciation Bottle ID	[13]Sample Description or ID	Date	Time	Signature	[17]Comp.	[18]Grab	TDS (PRISM) Pace	Hg - 245.1 ✓	Metals* ✓	Se, soluble ✓	Dionex ✓ (Br, F)	Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies) ✓	
2012006														
45 2010014	215 cpk	FGD Purge Eff	3/14	0800	T Johnson			1	1	1	1	1	1	7
58	14	EQ Tank Eff.							1	1	1	1*		5 ~~4~~
59	17	BioReactor 1 Inf								1	1	1*	1	5
60	18	BioReactor 2 Inf								1		1 *		3
61	19	BioReactor 2 Eff							1	1		1	1	5
62	20	Filter Blk									1			1
63	21	Metals Trip Blk								1			1	3
		(assigned new order, pple # s - cpk)												

The metals listed below will be analyzed during the months of Oct through January. Beginning in Feb. the metal analysis will fall back to 8 metals again: As,Ag,B,Cu,Cr,Ni,Se,Zn.

Customer to complete appropriate columns to right

Customer to sign & date below - fill out from left to right.

	Date/Time		Date/Time
1) Relinquished By: Tom Johnson		2) Accepted By: cpk	3-15-12
3) Relinquished By: Cindy Knox	3-15-12 1345	4) Accepted By:	3-15-12 1345
5) Relinquished By:		6) Accepted By:	
7) Relinquished By: cpk	3-15-12	8) Accepted By:	
9) Seal/Locked By: cpk	3-15-12	10) Seal/Lock Opened By	
11) Seal/Locked By		12) Seal/Lock Opened By	

Customer, IMPORTANT! Please indicate desired turnaround.

[22]Requested Turnaround

14 Days ___
*7 Days ___
*48 Hr ___
*Other ___
* Add. Cost Will Apply

3-22-12

Comments: * Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn thomas.d.johnson@siemens.com ICP-B, Sn